

CLAIMS

What is claimed is:

1. A method for removal of biological nutrients from a wastewater yielding a low phosphorous output comprising:
 - 5 a) providing a serial multistage bioreactor containing activated sludge having in hydraulic series an anaerobic zone and a downstream aerobic zone, each zone having an upstream inlet and a downstream outlet;
 - b) providing a wastewater to the anaerobic zone inlet;
 - c) adding a quantity of chemical to precipitate soluble and particulate phosphorous to the downstream aerobic zone in an amount sufficient to yield a low phosphorous output;
 - 10 d) separating treated water from the activated sludge and precipitated phosphorous; and
 - e) recycling return activated sludge separated by the immersed membrane filter from treated water to the anaerobic zone.
2. The method of claim 1 wherein step a) further comprises providing a multistage bioreactor having an anoxic zone in hydraulic series intermediate the anaerobic and downstream aerobic zone.
- 20 3. The method of claim 1 wherein the separating of step c) is performed by filtering through an immersed membrane filter operatively associated with the downstream aerobic zone.
- 25 4. The method of claim 1 wherein step a) further comprises providing a multistage bioreactor having an upstream anoxic zone, an upstream aerobic zone and a downstream anoxic zone in hydraulic series between the anaerobic zone and the downstream aerobic zone.

5. The method of claim 2 wherein in step d) the return activated sludge is first recycled to near an inlet to the anoxic zone and is then recycled from near an outlet of the anoxic zone to the anaerobic zone.

5 6. The method of claim 3 wherein in step d) the return activated sludge is recycled to near an inlet to the upstream anoxic zone and is then recycled from near an outlet of the upstream anoxic zone to the anaerobic zone.

10 7. The method of claim 6 wherein in step d) the return activated sludge is first recycled to near an inlet of the upstream aerobic zone and then recycled from near the outlet to the upstream aerobic zone to near the inlet of the upstream anoxic zone and from near the outlet of the upstream anoxic zone to the aerobic zone.

15 8. The method of claim 1 wherein in step c) the low phosphorous output is less than 0.25 mg/L.

9. The method of claim 1 wherein in step c) the low phosphorous output is less than 0.1 mg/L.